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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/772,253	02/06/2004	Mitsushi Fujiki	042068	6491

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WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP
1250 CONNECTICUT AVENUE, NW
SUITE 700
WASHINGTON, DC 20036

EXAMINER

PHAM, THANH V

ART UNIT	PAPER NUMBER
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2823

DATE MAILED: 06/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/772,253

Applicant(s)

FUJIKI, MITSUSHI

Examiner

Thanh V. Pham

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-5,7,9 and 10 is/are rejected.
- 7) ☒ Claim(s) 6 and 8 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 02/06/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Specification

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.
2. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-5, 7 and 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Corvasce et al. US 6,300,654 B1 in combination with Ohwaki et al., "Preferred Orientation in Ti Film Sputter-Deposited on SiO₂ Glass: The Role of Water Chemisorption on the Substrate", Jpn. J. Appl. Phys., Vol. 36 (1997) pp L154-L157 (provided by applicant) and Noguchi et al. US 6,716,749 B2.

Re claim 1, the Corvasce et al. reference discloses a method of manufacturing a semiconductor device of prior art, comprising:

forming an insulating film 24 over a semiconductor substrate 11;

forming a lower layer 26 of a lower-electrode conductive film on the insulating film 24;

forming an upper layer 7 of the lower-electrode conductive film on the lower layer 26, and constituting a lower-electrode conductive film by the upper and lower layers;

forming a ferroelectric film 17 of PZT or SBT (re claim 7) on the lower-electrode conductive film 7/26;

forming an upper-electrode conductive film 8 on the ferroelectric film 17; and
forming a ferroelectric capacitor by patterning the upper-electrode conductive film, the ferroelectric film, and the lower-electrode conductive film, fig. 3.

The Corvasce et al. reference does not disclose keeping substrate temperature higher than room temperature and lower than 300 °C while forming a lower layer 26 of a lower-electrode conductive film on the insulating film 24.

The Ohwaki et al. reference discloses a method for forming Ti (re claim 3) on glass which improves the orientation of the Ti film in the preferred (002) direction (re claim 4) by sputtering (re claim 2) with an amount of H₂O to enhance the Ti (002) preferred orientation (re claim 10) providing the temperature at 350 °C.

It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the conditions of Ohwaki et al. to the method of Corvasce et al.'s prior art because the conditions of Ohwaki et al. would provide the ferroelectric capacitor of Corvasce et al. with the Ti (002) preferred orientation for the reliability of the electrode. Further, choice of temperature, partial pressures of elements would have

been a matter of routine optimization because temperature and pressure are known to mutual affect each other and affect device properties and would depend on the desired device density on the finished wafer and the desired device characteristics. One of ordinary skill in the art would have been led to the recited temperature of higher than room temperature and lower than 300 °C while forming a Ti lower layer through routine experimentation to achieve desired deposition and reaction rates.

Re claim 5, Corvasce et al. reference discloses the upper layer of the lower-electrode conductive film is a single-layer film made of platinum, col. 3, line 64.

Re claim 9, the combination does not disclose the improvement of the insulating film before forming further the device. The Noguchi et al. reference discloses in col. 21, lines 10-13, quality of the insulating film is improved by exposed a surface of the insulating film to NH₃ plasma. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the process of the combination with NH₃ plasma nitridation before the lower layer of the lower-electrode conductive film is formed because the plasma nitridation would improve the surface of the insulating film as taught by Noguchi et al.

Allowable Subject Matter

5. Claims 6 and 8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

(Re claim 6, an orientation direction of the upper layer of the lower-electrode conductive film is a (222) direction. Re claim 8, an orientation direction of the ferroelectric film is a (111) direction.)

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

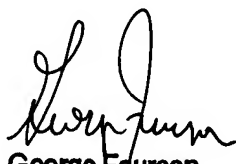
7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh V. Pham whose telephone number is 571-272-1866. The examiner can normally be reached on M-T (6:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



06/24/2005


George Fourson
Primary Examiner